



## I N D E X

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## JOHN MARTIN

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1 JOHN MARTIN,  
2 being first duly sworn, was examined and testified by  
3 ITV as follows:

4 THE COURT: Mr. Widseth.

5 DIRECT EXAMINATION

6 BY MR. WIDSETH:

7 Q. Could you please state your full name for the  
8 Court?

9 A. John Martin. J-o-h-n M-a-r-t-i-n.

10 Q. And what do you do for a living, Mr. Martin?

11 A. I'm a toxicologist. Specifically, my job duties  
12 are technical consultant and certifying scientist for  
13 Redwood Toxicology Laboratory.

14 Q. And where is Redwood Toxicology Laboratory  
15 located?

16 A. In Santa Rosa, California.

17 Q. And as the toxicologist in certifying -- first of  
18 all, how long have you been employed with Redwood  
19 Toxicology?

20 A. I've been with Redwood Toxicology for over  
21 11 years.

22 Q. And how long have you been a toxicologist?

23 A. I've been in the field of clinical laboratory  
24 science specifically for drugs of abuse testing for over  
25 30 years.

1 Q. And do you have any professional degrees?

2 A. Yes. I have a bachelor of arts in biology, a  
3 master of arts in biology, a master's of science in  
4 clinical laboratory science, and I'm also licensed under  
5 the Federal guidelines which are the Clinical Laboratory  
6 Improvement Act of 1988 as administered by the State of  
7 California and I have been so licensed for over  
8 30 years.

9 Q. And do you have any other licensures other than  
10 that one?

11 A. No. I'm also a member of the California  
12 Association of toxicologists.

13 Q. And in your employment with Redwood Toxicology  
14 have you been involved in the laboratory's use of EtG or  
15 EtS testing?

16 A. Yes.

17 Q. How long have you been involved with that?

18 A. Since the very beginning. We started research on  
19 testing back in March of 2006.

20 Q. And how long has Redwood Toxicology then used --  
21 and could you tell the judge kind of what the EtG and  
22 EtS testing is generally?

23 A. Certainly. There had been found and have been  
24 considered a time prior to that, I think it's like 1953,  
25 that when there was alcohol present in the liver, that

1     there would be -- it would be metabolized to certain  
2     products. Two of these products were ethyl glucuronide  
3     and ethyl sulfate. They are formed by different types  
4     of metabolism, so they are truly different metabolites  
5     of ethanol as detected in urine.

6             The analysis that's used -- there were a  
7     number of different analyses tried in the beginning, but  
8     today the highest level of testing is that by Liquid  
9     Chromatography/mass spectrometry/mass spectrometry or  
10    LC/MS/MS and it's that methodology that allows for  
11    quantitation at low levels of drugs. And the procedure  
12    that we developed is one that's published in the  
13    scientific literature and accepted there as a method for  
14    detecting EtG and EtS.

15            Basically what the protocol or standard  
16    that's used for testing is that a curve is run. In  
17    other words, a number of different samples of standards  
18    that are known and then after that is performed,  
19    controls are run. Those controls are at three different  
20    levels and also include a negative. And if those are  
21    acceptable, then the run can be processed at that time.  
22    And what it looks at is a number of different variables.  
23    It's often referred to when GCNS testing is used as  
24    finding a fingerprint in that each analyte has different  
25    parts of it that can be measured and those parts, as

1 they appear, have to match those of the standards so  
2 that the percentages of each one of the different types  
3 has to match as well as a specific time that it occurs,  
4 from the time the sample is interjected into the  
5 analyzer until the time it is at state. And so all of  
6 those things have to match that of the known standards  
7 before and have to match those in order to qualify to be  
8 called positive.

9 In our laboratory there have been recently  
10 newer methodologies that are starting to be used that  
11 are similar to the types of screens that are done  
12 routinely on urine, such that there may be sometime in  
13 the future screening processes that do not require the  
14 LC/MS/MS as the primary initial testing. In our  
15 laboratory we still use LC/MS/MS as the primary initial  
16 screening test. Once the sample goes through the  
17 initial screening process and it is determined to be  
18 positive, it is then taken and run a second time. That  
19 second time then allows for the quantitation of the  
20 specific analytes EtG and EtS. Once those are  
21 identified and those are verified by an analyst, then  
22 that run is reviewed by a certified scientist and then  
23 likewise, I have reviewed those results as well.

24 Q. So, just so the judge -- so we got the judge on  
25 the same page as we're on. The ethyl glucuronide -- if

1 you could pronounce that for me.

2 A. Ethyl glucuronide, EtG.

3 Q. EtG. And that's what I was going to get at.

4 That's EtG, right? And ethyl sulfate is the EtS?

5 A. Yes, sir.

6 Q. And those come as a metabolite I think you said  
7 of ingested ethanol then?

8 A. Yes.

9 Q. And how are they then detected using a urine  
10 sample? I mean, and I guess what I'm trying to get at  
11 is how do those metabolites get into the urine?

12 A. Oh, the metabolism takes place in the liver and  
13 so if there is ethanol present and there are the  
14 specific metabolic pathways that then cause -- one is  
15 called glucuronidation and the other one is called  
16 sulfation. So one of the pathways then recreates the  
17 product EtG, whereas the second metabolic pathway  
18 creates the EtS or ethyl sulfate.

19 Q. And that comes from ingested alcohol or ethanol  
20 you said then?

21 A. From ethanol, yes.

22 Q. Is it possible, at least in your experience and  
23 your understanding, to have EtG or EtS metabolites  
24 appear in the urine through transdermal or touching of  
25 the skin with ethanol?

1       A. Yes. There are a number of articles that are  
2 both published and unpublished that indicate that when  
3 there is the use of, as a class, hand sanitizers, some  
4 of those actually have as much as 62 percent ethanol.  
5 When there's the use of that product on the hands that  
6 there can be two different things that occur. There can  
7 be dermal and also there can be vapor. Most of the  
8 studies require the positive results obtained from the  
9 use of hand sanitizers to that of the ingestion of the  
10 vapors because it's so close.

11       Q. And I might be getting ahead of myself here.  
12 Let's go back to one thing. If you take a urine sample  
13 from someone, how long can you determine the presence of  
14 alcohol within that urine sample?

15       A. Okay, if we're talking about alcohol, alcohol  
16 itself is well-studied as far as under the influence and  
17 those vary depending on what type of ingestion there has  
18 been, but generally by the time ten or twelve hours have  
19 passed, the ethanol would be negative in the urine  
20 sample.

21       Q. And when you use EtG or EtS testing or the  
22 LC/MS/MS to test for EtG and EtS, how long is the  
23 detection period then for ethanol?

24       A. There is a longer window and that's one of the  
25 reasons for the advent of testing in alcohol programs in



1 that it also varies on the type of exposure that there  
2 may be and whether it's a single exposure or a multiple  
3 exposure and in cases where there truly was an abuse,  
4 those values can remain positive all the way up to  
5 80 hours.

6 Q. Okay. And is the use, I mean, you've got two  
7 different metabolites here. Does the presence of both  
8 of those have any greater significance as far as  
9 sensitivity or accuracy?

10 A. Only in -- in all the initial studies EtG was  
11 referred to. And then only secondarily the testing  
12 became available and EtS then was tested. As I said,  
13 there are two different types of metabolism. There is a  
14 single literature citing that shows that if there are a  
15 number of criteria met that a person is diabetic, that  
16 they have used, that they have glucose and they form  
17 ethanol in their urine, that and the suppressants of  
18 specific micro-organisms, that there could be an  
19 increase in EtG due to all of those things being  
20 present. The same article also shows that the EtS,  
21 because it is a different metabolic pathway, is not  
22 affected the same. So in our laboratory we err on the  
23 side of negative in that we only report a positive test  
24 if both ethyl glucuronide and ethyl sulfate are used.

25 Q. And so I can get the judge at least on the terms

1 then, what I think she might be hearing is when I look  
2 back at the articles here, there seems to be two issues  
3 that come up with the testing for EtS and EtG and that's  
4 sensitivity and accuracy. Can you explain each of those  
5 to the judge?

6 A. Well, certainly. The values have been found to  
7 be accurate, but the sensitivity is how low in a testing  
8 sequence you could go. And the original, all the  
9 original research tried to go to very low levels in that  
10 the test was used in order to monitor people in specific  
11 rehabilitation programs. And it was used as a  
12 counseling tool, so they wanted to be able to pick up  
13 essentially any, which was not possible, but extremely  
14 low levels and so that's one of the reasons that the  
15 cutoff levels were determined down to -- EtG down to 100  
16 nanograms per mL and EtS down to 25 nanograms per mL.

17 Q. Okay. So I at least get what I'm trying to get  
18 across to the judge here, these tests are very sensitive  
19 as far as it goes in determining the ingestion of  
20 alcohol, either through the skin or internally, is that  
21 correct?

22 A. Yes.

23 Q. And then the issue of accuracy, at least as I've  
24 seen it, deals more with determining where that alcohol  
25 came from, would that be right?

1 A. It can be that determination, yes.

2 Q. Or the method of ingestion, I should say. So in  
3 this case you've seen the results or you were the  
4 certifying analyst on Mr. Miller's results, is that  
5 correct?

6 A. Yes.

7 Q. And do you have those results in front of you?

8 A. Yes, I do.

9 Q. And the test results were positive for both of  
10 these metabolites, is that correct?

11 A. Yes, they were.

12 Q. And the levels on the test result, which is  
13 Exhibit 1, under the EtG, there's a cutoff of 100  
14 nanograms per milliliter, is that correct?

15 A. That's correct.

16 Q. And what does that represent to the Court, that  
17 cutoff level?

18 A. Essentially that's what I just mentioned. That  
19 cutoff level is the lowest level that the laboratory  
20 reports and it's the level at which values above that  
21 level then are often used in counseling situations.

22 Q. And is that a common cutoff level within the drug  
23 testing industry?

24 A. It is as far as the lowest level that's reported.  
25 The actual determination as far as what type of cutoff

1 level to use for only the ingestion of ethanol and/or  
2 secondary ingestion of ethanol has been -- a number of  
3 different cutoff levels have been used since the time  
4 the tests first started being performed.

5 Q. And how long have these tests -- I mean how long  
6 have we been testing for EtG?

7 A. Our laboratory has been testing since March of  
8 2006.

9 Q. And when did it come to the United States then,  
10 EtG testing?

11 A. The first, in a research only, it was back in the  
12 1950's.

13 Q. Okay. So the cutoff level, as I understand it,  
14 is kind of that minimal level where at least your lab  
15 determines that further testing of that sample to  
16 quantify the amount of EtS or EtG is done, is that  
17 right?

18 A. Yes.

19 Q. And then you do, as I think you indicated, the  
20 second test and that's where you come out with the  
21 actual numerical results for that urine sample?

22 A. Yes.

23 Q. And you said there is a number of cutoff levels  
24 that can be used at that point to determine  
25 incidental -- I think the terms that I see are

1 incidental ingestion from intentional ingestion, is that  
2 correct?

3 A. I said can be called incidental or secondary  
4 exposure.

5 Q. And where does that level get set then in any  
6 particular testing regiment? Who sets that?

7 A. There isn't anyone who specifically sets that.  
8 There have been recommendations made by the Substance  
9 Abuse and Mental Health Services Administration. There  
10 have been recommendations made by a number of the top  
11 researchers and there have been recommendations made by  
12 the U.S. Drug Court Professionals.

13 Q. And can you give the judge kind of the gist of  
14 where all of those recommendations fall as far as where  
15 that cutoff level should be?

16 A. Certainly. When the testing first began, it was  
17 thought that a cutoff level of 250 could be a reasonable  
18 cutoff level and these things changed over time and the  
19 studies started to begin to be available that showed  
20 that the use of some common products, cough medication,  
21 mouthwash, hand sanitizers, and even in some cases food  
22 products all contained ethanol, and when those were  
23 ingested, that they came up with levels of EtG.

24 And so then in reference then the cutoff  
25 levels were starting to be raised because in some of

1 these they showed that there could be, and most of the  
2 studies showed, not the hand sanitizers, but with the  
3 mouthwash and with the cough medicine that there could  
4 be levels as high as 250 with the ingestion of those  
5 products. And some of those products then were in  
6 excess, but not in excess to the amount that it would be  
7 equivalent to one or two drinks.

8 And so then there's also been studies on --  
9 in hand sanitizers as well and most of those studies  
10 indicate that the levels are less than 100. Although,  
11 there are a couple of studies where excessive use of the  
12 product which was -- I think I gave you a copy of that,  
13 but the excessive use they used a large quantity and it  
14 was so much that it couldn't be just rubbed on the  
15 hands. They had to run it all the way up and down their  
16 arms and it actually hurt their eyes after time, but in  
17 that case there was one sample that was as high as 700.  
18 So even if we were using a 500 cutoff, then that would  
19 indicate that there could have been exposure only due to  
20 secondary.

21 However, in this case when we're dealing  
22 with this particular sample, there's a value that's  
23 considerably higher than 700. Some of the principal  
24 researchers have said that they may wish to use a cutoff  
25 level of a thousand or of 1,500, but those levels are

1 hard to substantiate that there hadn't truly been the  
2 use of a secondary product in addition to the use of  
3 ingested ethanol, so it becomes difficult as far as  
4 interpreting.

5 Q. Are you aware of any scientific literature or  
6 papers regarding EtG or EtS testing which indicate that  
7 the incidental use in and of itself can result in EtG  
8 levels in excess of a thousand nanograms per milliliter?  
9 Are you aware of any generally accepted articles out  
10 there or peer review articles that would indicate that?

11 A. There may be as far as specific researcher's  
12 findings with a single individual or something like  
13 that, but as far as those articles that have been  
14 reviewed, the highest levels that I've seen indicated  
15 are one was 713. There was another one that was in the  
16 700s as well.

17 Q. And for the Court's benefit, you had kind of put  
18 together a letter kind of summarizing your conclusions  
19 in these report results, is that correct?

20 A. Yes.

21 Q. And you sent a copy of that to me today?

22 A. Yes.

23 MR. WIDSETH: And, Your Honor, I would like  
24 to mark Exhibit 2, if I could, please.

25 THE COURT: You may.

1 (Exhibit 2 was marked for identification.)

2 MR. WIDSETH: And I would offer Exhibit 2,  
3 Your Honor.

4 MR. GUDMUNDSON: No objection.

5 THE COURT: Court will receive Exhibit 2.

6 Q. (MR. WIDSETH CONTINUING) Now, Dr. Martin --  
7 Mr. Martin, with respect to the results that we have  
8 with respect to Mr. Miller, is there anything further  
9 that you can glean from the EtS result of 603?

10 A. Only in that similar to EtG there would be at  
11 least a minimal cutoff of five times the lowest level  
12 which would be 125, so it as well as the EtG are both  
13 well above those secondary type cutoffs.

14 Q. And do these -- does EtG, does it peak at any  
15 point? I assume like alcohol in the system it would go  
16 on some sort of curve, is that right or is that  
17 incorrect?

18 A. No, that's correct.

19 Q. And does the literature indicate that the EtG  
20 numbers peak at any point?

21 A. Yes.

22 Q. And at what point would that be?

23 A. Again, it may vary depending on the dose, but  
24 generally with a one ounce of pure ethanol which would  
25 be equivalent to one and a half to two drinks, the peak



1 levels at four to eight hours could range anywhere from  
2 700 to 2,000.

3 Q. And do those peaks, do you know, do they hold  
4 true with respect to not only the intentional ingestion  
5 of alcohol but also the incidental circumstances or  
6 incidental exposures or secondary exposures as you call  
7 them?

8 A. Each of the scientific articles do have some  
9 listing as far as when the peak levels were attained.  
10 And an example is with a Purell hand sanitizer. The one  
11 study found that the 713 was the highest and that was at  
12 nine hours. The other studies indicated similar in that  
13 eight to ten hours as far as a positive or peak value.

14 Q. And did you, at least in looking at that issue  
15 regarding specifically here hand cleaners, did you see  
16 any of the scientific literature that's been peer  
17 reviewed or generally accepted out there which would  
18 indicate that you could have a result as high as  
19 Mr. Miller's here solely by the use of hand sanitizers  
20 alone?

21 A. I haven't seen that article, but it doesn't mean  
22 that it would not be possible.

23 Q. And at least in your professional opinion would  
24 this EtG level of 1130 and the EtS level of 603 on  
25 Mr. Miller's test, would that reflect incidental

1 exposure to alcohol, in your opinion?

2 A. No. It could represent incidental alcohol in  
3 addition to ingestion of ethanol, but I don't believe it  
4 would be only secondary exposure.

5 Q. So you don't believe that those results could  
6 come about only from the incidental or secondary type of  
7 exposure that we've been discussing?

8 A. Correct.

9 Q. It would also have to involve some form of at  
10 least intentional or ingestion of alcohol?

11 A. Additional exposure to alcohol, yes, ethanol.

12 MR. WIDSETH: I don't have any further  
13 questions at this time, Your Honor.

14 THE COURT: Mr. Gudmundson.

15 CROSS-EXAMINATION

16 BY MR. GUDMUNDSON:

17 Q. Good afternoon, Mr. Martin.

18 A. Good afternoon.

19 Q. My name is Eric Gudmundson. I don't know if you  
20 recall talking to me on the phone sometime ago.

21 A. Oh, yes. Probably a month ago.

22 Q. Correct. I thank you very much for you being  
23 gracious with your time and you were very helpful to me.  
24 At that time one of the things I asked you was where I  
25 might go to find additional information on this subject,

1 do you recall that?

2 A. Yes, sir.

3 Q. And I believe you directed me to possibly look up  
4 on the Internet a Dr. Gregory Skipper?

5 A. Yes.

6 Q. And you're familiar with him, is that right?

7 A. Yes. He's one of the first people that  
8 investigated EtG in the United States.

9 Q. And you were aware that he maintained a website  
10 on the subject and so you directed me there, is that  
11 correct?

12 A. Yes. It's changed over time, but he does still  
13 maintain a website, correct.

14 Q. And you would, I assume, consider him an expert  
15 in this field?

16 A. Yes.

17 Q. Now, one of the things that you testified about  
18 was kind of a, at least at some point a disagreement  
19 about an appropriate cutoff level, correct?

20 A. Yes.

21 Q. And you mentioned a couple of different  
22 organizations or I guess I call them organizations. I  
23 don't know what they were, but can you list those again?

24 A. Well, certainly. There was an advisory by the  
25 Substance Abuse and Mental Health Services

1 Administration and it was, I think Dr. Skipper was one  
2 of the people on the panel as well as Paul Cary, but  
3 that, that advisory suggested against the use of EtG for  
4 punitive measures at low levels. There's a specific  
5 area in there, but it didn't go any further as far as  
6 delineating what would be a reasonable cutoff for  
7 secondary type exposures.

8 Q. So you're familiar with that advisory?

9 A. Yes.

10 Q. And it hasn't been withdrawn, isn't that correct?

11 A. No.

12 Q. It has not been withdrawn, correct?

13 A. Correct.

14 Q. And you're aware that that advisory specifically  
15 indicated that the use of the EtG test in determining  
16 abstinence lacks sufficient proven specificity for use  
17 as primary or sole evidence that an individual  
18 prohibited from drinking, in a criminal justice or  
19 regulatory compliance context, has truly been drinking.  
20 You're aware of that, correct?

21 A. Yes.

22 Q. And that legal or disciplinary action based  
23 solely on a positive EtG test or other test discussed in  
24 this advisory is inappropriate and scientifically  
25 unsupportable, correct?